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RAW SEQUENCE LISTING

DATE: 04/09/2002

PATENT APPLICATION: US/09/924,841

TIME: 11:25:27

Input Set : N:\Crf3\RULE60\09924841.raw

Output Set: N:\CRF3\04092002\I924841.raw

1 <110> APPLICANT: Dilley, David R
 2 Kadyrzhanova, Dina K
 3 Wang, Zhenyong
 4 Warner, Toni M
 5 <120> TITLE OF INVENTION: Modified Synthetases To Produce Penicillins and
 6 Cephalosporins Under the Control of Bicarbonate
 7 <130> FILE REFERENCE: MSU41-453
 8 <140> CURRENT APPLICATION NUMBER: 09/924,841
 9 <141> CURRENT FILING DATE: 2001-08-08
 11 <150> PRIOR APPLICATION NUMBER: US/09/413,231
 12 <151> PRIOR FILING DATE: 1999-10-06
 15 <160> NUMBER OF SEQ ID NOS: 18
 16 <170> SOFTWARE: PatentIn Ver. 2.0
 18 <210> SEQ ID NO: 1
 19 <211> LENGTH: 331
 20 <212> TYPE: PRT
 21 <213> ORGANISM: Artificial Sequence
 22 <220> FEATURE:
 23 <223> OTHER INFORMATION: Description of Artificial Sequence: modified IPNS
 24 from Emericella nidulans strain b1A1
 25 <221> NAME/KEY: MUTAGEN
 26 <222> LOCATION: (212)
 27 <223> OTHER INFORMATION: Glu212 in native IPNS modified to Arg
 28 <400> SEQUENCE: 1
 29 Met Gly Ser Val Ser Lys Ala Asn Val Pro Lys Ile Asp Val Ser Pro
 30 1 5 10 15
 31 Leu Phe Gly Asp Asp Gln Ala Ala Lys Met Arg Val Ala Gln Gln Ile
 32 20 25 30
 33 Asp Ala Ala Ser Arg Asp Thr Gly Phe Tyr Ala Val Asn His Gly
 34 35 40 45
 35 Ile Asn Val Gln Arg Leu Ser Gln Lys Thr Lys Glu Phe His Met Ser
 36 50 55 60
 37 Ile Thr Pro Glu Glu Lys Trp Asp Leu Ala Ile Arg Ala Tyr Asn Lys
 38 65 70 75 80
 39 Glu His Gln Asp Gln Val Arg Ala Gly Tyr Leu Ser Ile Pro Gly
 40 85 90 95
 41 Lys Lys Ala Val Glu Ser Phe Cys Tyr Leu Asn Pro Asn Phe Thr Pro
 42 100 105 110
 43 Asp His Pro Arg Ile Gln Ala Lys Thr Pro Thr His Glu Val Asn Val
 44 115 120 125
 45 Trp Pro Asp Glu Thr Lys His Pro Gly Phe Gln Asp Phe Ala Glu Gln
 46 130 135 140
 47 Tyr Tyr Trp Asp Val Phe Gly Leu Ser Ser Ala Leu Leu Lys Gly Tyr

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48      145      150      155      160
49      Ala Leu Ala Leu Gly Lys Glu Glu Asn Phe Phe Ala Arg His Phe Lys
50              165              170              175
51      Pro Asp Asp Thr Leu Ala Ser Val Val Leu Ile Arg Tyr Pro Tyr Leu
52              180              185              190
53      Asp Pro Tyr Pro Glu Ala Ala Ile Lys Thr Ala Ala Asp Gly Thr Lys
54              195              200              205
55      Leu Ser Phe Arg Trp His Glu Asp Val Ser Leu Ile Thr Val Leu Tyr
56              210              215              220
57      Gln Ser Asn Val Gln Asn Leu Gln Val Glu Thr Ala Ala Gly Tyr Gln
58      225              230              235              240
59      Asp Ile Glu Ala Asp Asp Thr Gly Tyr Leu Ile Asn Cys Gly Ser Tyr
60              245              250              255
61      Met Ala His Leu Thr Asn Asn Tyr Tyr Lys Ala Pro Ile His Arg Val
62              260              265              270
63      Lys Trp Val Asn Ala Glu Arg Gln Ser Leu Pro Phe Phe Val Asn Leu
64              275              280              285
65      Gly Tyr Asp Ser Val Ile Asp Pro Phe Asp Pro Arg Glu Pro Asn Gly
66              290              295              300
67      Lys Ser Asp Arg Glu Pro Leu Ser Tyr Gly Asp Tyr Leu Gln Asn Gly
68      305              310              315              320
69      Leu Val Ser Leu Ile Asn Lys Asn Gly Gln Thr
70              325              330

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72 <210> SEQ ID NO: 2

73 <211> LENGTH: 331

74 <212> TYPE: PRT

75 <213> ORGANISM: Artificial Sequence

76 <220> FEATURE:

77 <223> OTHER INFORMATION: Description of Artificial Sequence: modified IPNS
 78 from Emericella nidulans strain FGSC-4

79 <221> NAME/KEY: MUTAGEN

80 <222> LOCATION: (212)

81 <223> OTHER INFORMATION: Glu212 in native IPNS modified to Arg

82 <400> SEQUENCE: 2

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83      Met Gly Ser Val Ser Lys Ala Asn Val Pro Lys Ile Asp Val Ser Pro
84      1              5              10              15
85      Leu Phe Gly Asp Asp Gln Ala Ala Lys Met Arg Val Ala Gln Gln Ile
86              20              25              30
87      Asp Ala Ala Ser Arg Asp Thr Gly Phe Phe Tyr Ala Val Asn His Gly
88              35              40              45
89      Ile Asn Val Gln Arg Leu Ser Gln Lys Thr Lys Glu Phe His Met Ser
90              50              55              60
91      Ile Thr Pro Glu Glu Lys Trp Asp Leu Ala Ile Arg Ala Tyr Asn Lys
92      65              70              75              80
93      Glu His Gln Asp Gln Val Arg Ala Gly Tyr Tyr Leu Ser Ile Pro Gly
94              85              90              95
95      Lys Lys Ala Val Glu Ser Phe Cys Tyr Leu Asn Pro Asn Phe Thr Pro
96              100              105              110
97      Asp His Pro Arg Ile Gln Ala Lys Thr Pro Thr His Glu Val Asn Val

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RAW SEQUENCE LISTING

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Input Set : N:\Crf3\RULE60\09924841.raw

Output Set: N:\CRF3\04092002\I924841.raw

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98          115          120          125
99      Trp Pro Asp Glu Thr Lys His Pro Gly Phe Gln Asp Phe Ala Glu Gln
100          130          135          140
101      Tyr Tyr Trp Asp Val Phe Gly Leu Ser Ser Ala Leu Leu Lys Gly Tyr
102      145          150          155          160
103      Ala Leu Ala Leu Gly Lys Glu Glu Asn Phe Phe Ala Arg His Phe Lys
104          165          170          175
105      Pro Asp Asp Thr Leu Ala Ser Val Val Leu Ile Arg Tyr Pro Tyr Leu
106          180          185          190
107      Asp Pro Tyr Pro Glu Ala Ala Ile Lys Thr Ala Ala Asp Gly Thr Lys
108          195          200          205
109      Leu Ser Phe Arg Trp His Glu Asp Val Ser Leu Ile Thr Val Leu Tyr
110          210          215          220
111      Gln Ser Asn Val Gln Asn Leu Gln Val Glu Thr Ala Ala Gly Tyr Gln
112      225          230          235          240
113      Asp Ile Glu Ala Asp Asp Thr Gly Tyr Leu Ile Asn Cys Gly Ser Tyr
114          245          250          255
115      Met Ala His Leu Thr Asn Asn Tyr Tyr Lys Ala Pro Ile His Arg Val
116          260          265          270
117      Lys Trp Val Asn Ala Glu Arg Gln Ser Leu Pro Phe Phe Val Asn Leu
118          275          280          285
119      Gly Tyr Asp Ser Val Ile Asp Pro Phe Asp Pro Arg Glu Pro Asn Gly
120          290          295          300
121      Lys Ser Asp Arg Glu Pro Leu Ser Tyr Gly Asp Tyr Leu Gln Asn Gly
122      305          310          315          320
123      Leu Val Ser Leu Ile Asn Lys Asn Gly Gln Thr
124          325          330
126 <210> SEQ ID NO: 3
127 <211> LENGTH: 331
128 <212> TYPE: PRT
129 <213> ORGANISM: Artificial Sequence
130 <220> FEATURE:
131 <223> OTHER INFORMATION: Description of Artificial Sequence: modified IPNS
132      from Emericella nidulans strain bioA1
133 <221> NAME/KEY: MUTAGEN
134 <222> LOCATION: (212)
135 <223> OTHER INFORMATION: Glu212 in native IPNS modified to Arg
136 <400> SEQUENCE: 3
137      Met Gly Ser Val Ser Lys Ala Asn Val Pro Lys Ile Asp Val Ser Pro
138          1          5          10          15
139      Leu Phe Gly Asp Gln Ala Ala Lys Met Arg Val Ala Gln Gln Ile
140          20          25          30
141      Asp Ala Ala Ser Arg Asp Thr Gly Phe Phe Tyr Ala Val Asn His Gly
142          35          40          45
143      Ile Asn Val Gln Arg Leu Ser Gln Lys Thr Lys Glu Phe His Met Ser
144          50          55          60
145      Ile Thr Pro Glu Glu Lys Trp Asp Leu Ala Ile Arg Ala Tyr Asn Lys
146          65          70          75          80
147      Glu His Gln Asp Gln Val Arg Ala Gly Tyr Tyr Leu Ser Ile Pro Gly

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RAW SEQUENCE LISTING

DATE: 04/09/2002

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Input Set : N:\Crif3\RULE60\09924841.raw

Output Set: N:\CRF3\04092002\I924841.raw

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148                               85                               90                               95
149      Lys Lys Ala Val Glu Ser Phe Cys Tyr Leu Asn Pro Asn Phe Thr Pro
150                               100                               105                               110
151      Asp His Pro Arg Ile Gln Ala Lys Thr Pro Thr His Glu Val Asn Val
152                               115                               120                               125
153      Trp Pro Asp Glu Thr Lys His Pro Gly Phe Gln Asp Phe Ala Glu Gln
154                               130                               135                               140
155      Tyr Tyr Trp Asp Val Phe Gly Leu Ser Ser Ala Leu Leu Lys Gly Tyr
156      145                               150                               155                               160
157      Ala Leu Ala Leu Gly Lys Glu Glu Asn Phe Phe Ala Arg His Phe Lys
158                               165                               170                               175
159      Pro Asp Asp Thr Leu Ala Ser Val Val Leu Ile Arg Tyr Pro Tyr Leu
160                               180                               185                               190
161      Asp Pro Tyr Pro Glu Ala Ala Ile Lys Thr Ala Ala Asp Gly Thr Lys
162                               195                               200                               205
163      Leu Ser Phe Arg Trp His Glu Asp Val Ser Leu Ile Thr Val Leu Tyr
164      210                               215                               220
165      Gln Ser Asn Val Gln Asn Leu Gln Val Glu Thr Ala Ala Gly Tyr Gln
166      225                               230                               235                               240
167      Asp Ile Glu Ala Asp Asp Thr Gly Tyr Leu Ile Asn Cys Gly Ser Tyr
168                               245                               250                               255
169      Met Ala His Leu Thr Asn Asn Tyr Tyr Lys Ala Pro Ile His Arg Val
170      260                               265                               270
171      Lys Trp Val Asn Ala Glu Arg Gln Ser Leu Pro Phe Phe Val Asn Leu
172      275                               280                               285
173      Gly Tyr Asp Ser Val Ile Asp Pro Phe Asp Pro Arg Glu Pro Asn Gly
174      290                               295                               300
175      Lys Ser Asp Arg Glu Pro Leu Ser Tyr Gly Asp Tyr Leu Gln Asn Gly
176      305                               310                               315                               320
177      Leu Val Ser Leu Ile Asn Lys Asn Gly Gln Thr
178      325                               330
180 <210> SEQ ID NO: 4
181 <211> LENGTH: 331
182 <212> TYPE: PRT
183 <213> ORGANISM: Artificial Sequence
184 <220> FEATURE:
185 <223> OTHER INFORMATION: Description of Artificial Sequence: modified IPNS
186      from Penicillium chrysogenum
187 <221> NAME/KEY: MUTAGEN
188 <222> LOCATION: (212)
189 <223> OTHER INFORMATION: Glu212 in native IPNS modified to Arg
190 <400> SEQUENCE: 4
191      Met Ala Ser Thr Pro Lys Ala Asn Val Pro Lys Ile Asp Val Ser Pro
192      1                               5                               10                               15
193      Leu Phe Gly Asp Asn Met Glu Glu Lys Met Lys Val Ala Arg Ala Ile
194      20                               25                               30
195      Asp Ala Ala Ser Arg Asp Thr Gly Phe Phe Tyr Ala Val Asn His Gly
196      35                               40                               45
197      Val Asp Val Lys Arg Leu Ser Asn Lys Thr Arg Glu Phe His Phe Ser

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RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/924,841

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Input Set : N:\Crf3\RULE60\09924841.raw

Output Set: N:\CRF3\04092002\I924841.raw

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198          50          55          60
199  Ile Thr Asp Glu Glu Lys Trp Asp Leu Ala Ile Arg Ala Tyr Asn Lys
200      65          70          75          80
201  Glu His Gln Asp Gln Ile Arg Ala Gly Tyr Tyr Leu Ser Ile Pro Glu
202          85          90          95
203  Lys Lys Ala Val Glu Ser Phe Cys Tyr Leu Asn Pro Asn Phe Lys Pro
204          100          105          110
205  Asp His Pro Leu Ile Gln Ser Lys Thr Pro Thr His Glu Val Asn Val
206          115          120          125
207  Trp Pro Asp Glu Lys Lys His Pro Gly Phe Arg Glu Phe Ala Glu Gln
208          130          135          140
209  Tyr Tyr Trp Asp Val Phe Gly Leu Ser Ser Ala Leu Leu Arg Gly Tyr
210          145          150          155          160
211  Ala Leu Ala Leu Gly Lys Glu Glu Asp Phe Phe Ser Arg His Phe Lys
212          165          170          175
213  Lys Glu Asp Ala Leu Ser Ser Val Val Leu Ile Arg Tyr Pro Tyr Leu
214          180          185          190
215  Asn Pro Ile Pro Pro Ala Ala Ile Lys Thr Ala Glu Asp Gly Thr Lys
216          195          200          205
217  Leu Ser Phe Arg Trp His Glu Asp Val Ser Leu Ile Thr Val Leu Tyr
218          210          215          220
219  Gln Ser Asp Val Ala Asn Leu Gln Val Glu Met Pro Gln Gly Tyr Leu
220          225          230          235          240
221  Asp Ile Glu Ala Asp Asp Asn Ala Tyr Leu Val Asn Cys Gly Ser Tyr
222          245          250          255
223  Met Ala His Ile Thr Asn Asn Tyr Tyr Pro Ala Pro Ile His Arg Val
224          260          265          270
225  Lys Trp Val Asn Glu Glu Arg Gln Ser Leu Pro Phe Phe Val Asn Leu
226          275          280          285
227  Gly Phe Asn Asp Thr Val Gln Pro Trp Asp Pro Ser Lys Glu Asp Gly
228          290          295          300
229  Lys Thr Asp Gln Arg Pro Ile Ser Tyr Gly Asp Tyr Leu Gln Asn Gly
230          305          310          315          320
231  Leu Val Ser Leu Ile Asn Lys Asn Gly Gln Thr
232          325          330
234 <210> SEQ ID NO: 5
235 <211> LENGTH: 329
236 <212> TYPE: PRT
237 <213> ORGANISM: Artificial Sequence
238 <220> FEATURE:
239 <223> OTHER INFORMATION: Description of Artificial Sequence: modified IPNS
240    from Streptomyces clavuligerus
241 <221> NAME/KEY: MUTAGEN
242 <222> LOCATION: (210)
243 <223> OTHER INFORMATION: Glu210 in native IPNS modified to Arg
244 <400> SEQUENCE: 5
245  Met Pro Val Leu Met Pro Ser Ala His Val Pro Thr Ile Asp Ile Ser
246      1          5          10          15
247  Pro Leu Phe Gly Thr Asp Ala Ala Ala Lys Lys Arg Val Ala Glu Glu

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VERIFICATION SUMMARY

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